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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/643,845	08/19/2003	Eugene Lichman	17083/002001	4919

7590 05/05/2004  
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EXAMINER

DOUGHERTY, ANTHONY T

ART UNIT	PAPER NUMBER
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2863

DATE MAILED: 05/05/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	<b>Application No.</b> 10/643,845	<b>Applicant(s)</b> LICHMAN, EUGENE	
	<b>Examiner</b> Anthony T. Dougherty	<b>Art Unit</b> 2863	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) ☒ Responsive to communication(s) filed on 19 August 2003.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) ☒ Claim(s) 1-36 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-3, 5-8, 15-17, 19-22, 29, 30, 32 and 33 is/are rejected.
- 7) ☒ Claim(s) 4, 9-14, 18, 23-28, 31 and 34-36 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 19 August 2003 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

## **DETAILED ACTION**

### ***Drawings***

1. The drawings are objected to because items 102, 104, 106, 108, and 110 in Figure 1 should be labeled with descriptive text labels. Someone looking at any drawing should be able to get some sense of what the drawing is about without in depth reading of the specification. This is especially important because examiners use the drawings to help them identify prior art. Note that it is to the applicant's advantage to make the drawings as helpful as possible to the examining corps, in order to ensure that her/his patent will be found and used as prior art against a possible future similar invention. The drawing that is put on the face of the patent is especially important, because it is the first one an examiner sees when viewing prior art. Since the examiner plans to choose Figure 1 for printing on the face of any patent that should issue from this application, the examiner is requiring the afore mentioned labels be inserted. A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

### ***Claim Objections***

2. The numbering of claims is not in accordance with 37 CFR 1.126 which requires the original numbering of the claims to be preserved throughout the prosecution. When claims are canceled, the remaining claims must not be renumbered. When new claims are presented, they must be numbered consecutively beginning with the number next following the highest numbered claims previously presented (whether entered or not).

There are two distinct claims numbered 18, therefore misnumbered claims 18-35 have been renumbered 18-36. Below is a table indicating the renumbering:

The renumbering indicated in the table above is the claim numbering used throughout the remainder of this action.

***Claim Rejections - 35 USC § 102***

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

4. Claims 1-3, 5-8, 15-17, 19-22, 29, 30, 32, and 33 rejected under 35 U.S.C. 102(b) as being anticipated by U.S. Patent No. 5,414,674 to Lichman.

With regard to claim 1 Lichman discloses a method for detecting hydrocarbons (see Abstract), by obtaining seismic trace data for a region of interest (see column 3 line 59 through line 61), and processing the seismic trace data to determine at least one wavelet energy absorption factor as a function of position within the region of interest (see column 3 line 61 through column 4 line 37).

With regard to claim 15 Lichman discloses a hydrocarbon detection system that (see Abstract) with a memory having hydrocarbon detection software (see column 4 line 63 through line 68), and a processor coupled to the memory to execute the hydrocarbon detection software

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(see column 4 line 67), wherein the hydrocarbon detection software configures the processor to retrieve seismic trace data from a storage device (see column 4 line 65 through line 67), and further configures the processor to process the seismic trace data to determine at least one wavelet absorption factor (see column 3 line 61 through column 4 line 37).

With regard to claims 2 and 16 and applying the rejection of claims 1 and 15 above, Lichman discloses calculating a wavelet spectrum for each of multiple positions in the region of interest (see column 5 line 51 through column 6 line 5), and fitting a parameterized model to the wavelet spectrum (see column 6 line 6 through line 20).

With regard to claims 3 and 17, and applying the rejection of claims 2 and 16 above, Lichman discloses the parameters of the parameterized model include a gas absorption factor and a liquid absorption factor (see column 4 line 3 through line 15).

With regard to claims 5 and 19 and applying the rejection of claims 2 and 16 above, Lichman discloses scaling the wavelet spectrum to a predetermined length (see column 5 line 23 through line 50).

With regard to claims 6 and 20 and applying the rejection of claims 2 and 16 above, Lichman discloses performing time interpolation on the trace data (see column 5 line 23 through line 48).

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With regard to claims 7 and 21, and applying the rejection of claims 1 and 15 above, Lichman discloses selecting trace intervals with a sliding window (see column 5 line 23 through line 25), padding the trace intervals with zero values (see column 5 line 30 through line 32), and performing a Fourier Transform on the zero-padded trace intervals to determine discrete frequency spectra (see column 5 line 45 through line 56).

With regard to claims 8 and 22, and applying the rejection of claims 7 and 21 above, Lichman discloses transforming each discrete frequency spectrum into a corresponding cepstrum (see column 5 line 7 through line 12), separating wavelet information in each cepstrum from reflectivity information (see column 5 line 7 through line 8), and determining a corresponding wavelet spectrum from the wavelet information in each cepstrum (see column 7 line 46 through line 52).

With regard to claim 29 Lichman discloses a method for detecting hydrocarbons (see Abstract) by receiving from a user an indication of a region of interest in a seismic data set (see column 4 line 63 through line 68), and generating a display of wavelet energy absorption anomalies within the region of interest (see column 3 line 61 through column 4 line 37).

With regard to claim 30, and applying the rejection of claim 29 above, Lichman discloses 29 calculating at least one wavelet energy absorption factor as a function of position within the region of interest (see column 5 line 51 through column 6 line 5).

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With regard to claim 32, and applying the rejection of claim 30 above, Lichman discloses at least one wavelet energy absorption factor is indicative of gas absorption (see column 4 line 9).

With regard to claim 33, and applying the rejection of claim 30 above, Lichman discloses at least one wavelet energy absorption factor is indicative of liquid absorption (see column 4 line 6 through line 7).

*Allowable Subject Matter*

5. Claims 4, 9-14, 18, 23-28, 31, and 34-36 objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

6. The following is a statement of reasons for the indication of allowable subject matter:

The primary reason for the allowance of claim 4 is the inclusion of the method step of detecting hydrocarbons by using a parameterized model expressible as:

$$A(w) = \begin{cases} a_1 + a_2 w^{Q_L} & \text{for } 0 \leq w < w_D \\ a_3 e^{-Q_G w} & \text{for } w > w_D \end{cases}$$

wherein  $w$  is frequency,  $w_D$  is a dominant frequency,  $a_1$ ,  $a_2$ , and  $a_3$  are constants,  $Q_L$  is a liquid absorption factor, and  $Q_G$  is a gas absorption factor. It is this step found in each of the claims, as it is claimed in the combination, that has not been found, taught or suggested by the prior art of record which makes these claims allowable over the prior art.

The primary reason for the allowance of claims 9-14 and 31 is the inclusion of the method step of detecting hydrocarbons by determining a background absorption function for at least one wavelet energy absorption factor. It is this step found in each of the claims, as it is claimed in the combination, that has not been found, taught or suggested by the prior art of record which makes these claims allowable over the prior art.

The primary reason for the allowance of claim 18 is the inclusion of the limitation of a hydrocarbon detection system with a parameterized model expressible as:

$$A(w) = \begin{cases} a_1 + a_2 w^{Q_L} & \text{for } 0 \leq w < w_D \\ a_3 e^{-Q_G w} & \text{for } w > w_D \end{cases}$$

wherein  $w$  is frequency,  $w_D$  is a dominant frequency,  $a_1$ ,  $a_2$ , and  $a_3$  are constants,  $Q_L$  is a liquid absorption factor, and  $Q_G$  is a gas absorption factor. It is this limitation found in each of the claims, as it is claimed in the combination, that has not been found, taught or suggested by the prior art of record which makes these claims allowable over the prior art.

The primary reason for the allowance of claims 23-28 is the inclusion of the limitation of a hydrocarbon detection system with hydrocarbon detection software configured to determine a background absorption function for a wavelet absorption factor. It is this limitation found in each of the claims, as it is claimed in the combination, that has not been found, taught or suggested by the prior art of record which makes these claims allowable over the prior art.



The primary reason for the allowance of claims 34-36 is the inclusion of the method step of detecting hydrocarbons by determining wavelet energy absorption factor values that provide a least-square-error fit between a parameterized model and wavelet spectra extracted from the seismic data set. It is this step found in each of the claims, as it is claimed in the combination, that has not been found, taught or suggested by the prior art of record which makes these claims allowable over the prior art.

### ***Conclusion***

7. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

U.S. Patent No. 5,583,825 to Carrazzone et al. because it teaches a method of hydrocarbon detection that uses calibration location data.

U.S. Patent No. 5,671,136 to Willhoit, Jr. because it teaches a method of hydrocarbon detection that uses seismic imaging.

U.S. Patent No. 5,966,672 to Knupp because it teaches a method of hydrocarbon detection using seismic imaging and modeling and calibration data.

U.S. Patent No. 5,173,880 to Duren et al. because it teaches the general concepts of seismic imaging in detecting subsurface anomalies such as hydrocarbon reservoirs.

U.S. Patent No. 5,740,036 to Ahuja et al. because it teaches a method of analyzing seismic data using wavelet analysis.

U.S. Patent No. 5,870,691 to Partyka et al. because it teaches a method of analyzing seismic data using spectral decomposition.

U.S. Patent No. 5,351,544 to Endo et al. because it teaches a method of analyzing ultrasonic reflection data using a power spectrum to determine the flaking state of a specimen.

U.S. Patent No. 4,884,247 to Hadidi et al. because it teaches a method of analyzing seismic data to determine subsurface properties including reflection compensation.

U.S. Patent No. 4,694,438 to Sengupta because it teaches a method of hydrocarbon detection by processing seismic data.

U.S. Patent No. 4,316,268 to Ostrander because it teaches a method of hydrocarbon detection by processing seismic data.

U.S. Patent No. 4,316,267 to Ostrander because it teaches a method of hydrocarbon detection by processing seismic data.

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Any inquiry concerning this communication or earlier communications from the examiner should be directed to Anthony T. Dougherty whose telephone number is (571) 272-2273. The examiner can normally be reached on Monday through Friday from 8 to 5.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, John E. Barlow can be reached on (571) 272-2269. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



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